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Optimization of Physical Education Classes by Adapting the Methods for Developing the Coordination Ability in 5th Grade Students

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Abstract

Nowadays the volume of activities performed under varying and unexpected conditions has significantly increased. This requires the individual manifestation of sharpness, cleverness, ingenuity, reaction speed, concentration and ability to transfer attention, movement precision (spatial, temporal, dynamic) and their biomechanical rationalization. The present paper shows that influencing the educational process by using appropriate methods and means for developing coordination abilities can stimulate the students' interest and positive attitude towards physical exercise in general, and towards physical education classes in particular.

Keywords: coordination ability, physical education class, optimization, 5th grade.

1. Purpose of the research

In this experimental study we propose to increase the efficiency of the physical education class and develop efficient driving skills among students in the 5th grade by determining and highlighting exercise content focusing on the development of coordination abilities. Thus, our study is focused on determining the specific teaching content in order to create the appropriate conditions meant to develop driving skills in general and coordination in particular.

Similar studies on coordination abilities or their components have also been performed by other specialists in the field who have approached the subject from various perspectives, such as those of volleyball, fencing,

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gymnastics, to only mention a few (Dragnea, Bota, 1999; Croitoru, 1999; Tudor V. 1999; Şerbănoiu, 2001; Dragnea et al, 2006; Grigore, 2007; Macovei 2007).

2. The research objectives

- Information and documentation from the literature on the issue of the pupils' coordination skills in the 5th grade;
- Developing and experimenting the specific means, systems and methods regarding the coordination capacity of 5th grade students and highlighting their influence on their driving skills;
- Theoretical and experimental thinking on the design of specific means for developing coordination skills during physical education classes with pupils in the 5th grade.

3. The research hypothesis

It is assumed that the use of a greater share of methods for the development of the coordination capacity during physical education classes in the 5th grade will help optimize student training, substantially fostering: the development of coordination skills; improving driving skills, increasing interest for the physical education curriculum.

4. Place, time, and materials used in the experiment

The experiment was conducted at the Glodeanu Sarat School, grades 1st to 8th, in Buzau, betweeb October 1st 2011 and June 1st 2012. Our research was conducted on two samples as follows: 17 experimental group students (9 boys + 8 girls) in grade 5th B, 16 control group students (9 boys + 7 girls) in 5th grade A.

Material conditions**:** the sports facilities available at the Glodeanu Sarat School, grades 1st to 8th, which include: gym, handball court, throwing area, jumping area.

5. Content of the experiment

During the 2011-2012 school year, the physical education classes of the experimental group were monitored at various points from the point of view of their ability to contribute to the development of the students' coordination skills. For that purpose, several planning and design activities have been developed and implemented, that were necessary for achieving the appropriate teaching parameters and conducting activities with students in this class: annual schedule of the teaching units; semester calendar plan; lesson plans; operational models proposed for achieving the training objectives.

A simplified model was proposed for the experimental class, with a view to developing each component of the students' coordination abilities. Various exercises were used under standard conditions and new exercises were tailored to the school's specific conditions. The content and the means we have developed were meant to achieve the following:

- *Developing the capacity of combining and connecting movements by*: progressive, partial or total, coupling of two known skills by emphasizing certain sequences; segmental coordination between upper and lower limbs; asymmetric exercises; the combination of skills which require different resistors;
- *Developing temporal and spatial orientation by*: movement using preset spaces; use of non-standard spaces, using unusual positions, situations and movements;
- *Developing the capacity for kinaesthetic differentiation by*: using exercises that require a progressive increase in the level of precision or push (jumping from heights and different distances); throwing the ball from different distances and positions;

- *Developing the capacity for balance by*: using exercises that require body balance or devices controlled by students; using basic acrobatic exercises;
- *Developing motor response capacity by*: using exercises that require response to visual, acoustic, tactile, and kinaesthetic stimuli in a progressively complex form;
- *Developing the capacity to transform motion*: creating game situations for actions where unforeseen changes are required; using lesser known tracks, with variations in the environment.
- *Developing the sense of rhythm*: using rhythm variations in practice; restoring some movement frequency; emphasis on the execution of acoustic rhythms.

Table 1. Table summarizing the statistical indicators of the tests conducted for assessing the students' coordination capacity in the control and experimental groups (girls)

No.	Tests and measurements	Initial testing		t	Final testing		t
		GC	GE		GC	GE	
		$x \pm m$	$x \pm m$		$x \pm m$	$x \pm m$	
1	Jumping marking (cm)	5.85 ± 0.24	6.03 ± 0.24	0.53	5.55 ± 0.22	4.92 ± 0.20	2.10
2	Shooting the ball into the target (point)	6.06 ± 0.32	6.03 ± 0.32	0.03	6.80 ± 0.30	7.65 ± 0.28	2.07
3	Bank balance (sec)	14.95 ± 0.35	14.84 ± 0.36	0.22	14.14 ± 0.34	13.20 ± 0.31	2.04
4	Dynamic balance test (cm)	46.36 ± 0.68	46.06 ± 0.67	0.31	44.86 ± 0.60	43.17 ± 0.58	2.03
5	Back balance (point)	47.64 ± 0.82	47.41 ± 0.80	0.20	49.55 ± 0.80	51.83 ± 0.75	2.08
6	Sprint paced proposed (sec)	0.86 ± 0.03	0.89 ± 0.04	0.60	0.83 ± 0.03	0.75 ± 0.02	2.22
7	„In square" test (sec)	9.46 ± 0.28	9.39 ± 0.27	0.18	8.83 ± 0.25	8.15 ± 0.22	2.06
8	Assessment test distance (cm)	104.05 ± 3.3	103.94 ± 3.2	0.02	96.39 ± 3.23	87.14 ± 3.13	2.06
9	Commute (sec)	14.24 ± 0.18	14.23 ± 0.18	0.36	13.82 ± 0.17	13.35 ± 0.15	2.04
10	Hexagon (sec)	22.52 ± 0.38	22.49 ± 0.33	0.06	22.19 ± 0.37	21.20 ± 0.30	2.10
11	Matorin test (dgr)	291.21 ± 3.3	290.31 ± 3.2	0.20	298.18 ± 3.18	307.5 ± 2.92	2.16

Table 2. Table summarizing the statistical significance tests conducted for assessing the coordination capacities of the students in the control and experimental groups (girls)

No.	Tests and measurements	Control group		t	Experimental group		t
		TI	TF		TI	TF	
		$\bar{x} \pm m$	$x \pm m$		$x \pm m$	$x \pm m$	
1	Jumping marking (cm)	5.85 ± 0.24	5.55 ± 0.22	1.15	6.03 ± 0.24	4.92 ± 0.20	4.44
2	Shooting the ball into the target (point)	6.06 ± 0.32	6.80 ± 0.30	2.11	6.03 ± 0.32	7.65 ± 0.28	4.76
3	Bank balance (sec)	14.95 ± 0.35	14.14 ± 0.34	2.07	14.84 ± 0.36	13.20 ± 0.31	4.31
4	Dynamic balance test (cm)	46.00 ± 0.68	44.86 ± 0.60	2.05	46.06 ± 0.67	43.17 ± 0.58	4.07
5	Back balance (point)	47.64 ± 0.82	49.55 ± 0.80	2.07	47.41 ± 0.80	51.83 ± 0.75	4.57
6	Sprint paced proposed (sec)	0.86 ± 0.03	0.83 ± 0.03	0.88	0.89 ± 0.04	0.75 ± 0.02	3.68
7	„In square" test (sec)	9.46 ± 0.28	8.83 ± 0.25	2.10	9.39 ± 0.27	8.15 ± 0.22	4.43
8	Assessment test distance (cm)	104.05 ± 3.3	96.39 ± 3.23	2.08	103.94 ± 3.20	87.14 ± 3.13	4.69
9	Commute (sec)	14.24 ± 0.18	13.82 ± 0.17	2.11	14.23 ± 0.18	13.35 ± 0.15	4.63

10	Hexagon (sec)	22.52 ± 0.38	22.19 ± 0.37	0.78	22.49 ± 0.33	21.20 ± 0.30	3.58
11	Matorin test (dgr)	291.31 ± 3.3	298.18 ± 3.2	1.52	290.31 ± 3.19	307.50 ± 2.9	3.97

Table 3. Table summarizing the statistical indicators of the tests conducted for assessing the students' coordination capacity in the control and experimental groups (boys)

No.	Tests and measurements	Initial testing		t	Final testing		t
		GC	GE		GC	GE	
		$x \pm m$	$x \pm m$		$x \pm m$	$x \pm m$	
1	Jumping marking (cm)	5.44 ± 0.17	5.27 ± 0.14	0.77	5.04 ± 0.21	4.64 ± 0.11	2.06
2	Shooting the ball into the target (point)	6.69 ± 0.21	6.75 ± 0.22	0.20	7.18 ± 0.20	7.74 ± 0.19	2.00
3	Bank balance (sec)	14.08 ± 0.44	14.31 ± 0.47	0.36	13.08 ± 0.42	11.90 ± 0.40	2.03
4	Dynamic balance test (cm)	44.56 ± 0.90	44.90 ± 0.98	0.25	42.47 ± 0.87	39.87 ± 0.86	2.13
5	Back balance (point)	48.56 ± 0.82	48.00 ± 0.80	0.49	49.23 ± 0.81	51.61 ± 0.75	2.16
6	Sprint paced proposed (sec)	0.86 ± 0.03	0.85 ± 0.03	0.24	0.84 ± 0.03	0.76 ± 0.02	2.22
7	„In square" test (sec)	9.27 ± 0.24	9.32 ± 0.27	0.14	8.73 ± 0.23	8.07 ± 0.21	2.13
8	Assessment test distance (cm)	87.59 ± 2.60	87.42 ± 2.59	0.04	81.36 ± 2.48	74.10 ± 2.31	2.14
9	Commute (sec)	13.80 ± 0.16	13.74 ± 0.16	0.26	13.43 ± 0.15	13.00 ± 0.14	2.10
10	Hexagon (sec)	22.37 ± 0.24	22.27 ± 0.21	0.31	21.83 ± 0.23	21.23 ± 0.18	2.07
11	Matorin test (dgr)	311.2 ± 2.99	312.74 ± 2.96	0.35	318.11 ± 2.85	326.3 ± 2.63	2.10

Table 4. Table summarizing the statistical significance tests conducted for assessing the coordination capacities of the students in the control and experimental groups (boys)

No.	Tests and measurements	Control group		t	Experimental group		t
		TI	TF		TI	TF	
		$x \pm m$	$x \pm m$		$x \pm m$	$x \pm m$	
1	Jumping marking (cm)	5.44 ± 0.17	5.04 ± 0.21	2.14	5.27 ± 0.14	4.64 ± 0.11	4.40
2	Shooting the ball into the target (point)	6.69 ± 0.21	7.18 ± 0.20	2.13	6.75 ± 0.22	7.74 ± 0.19	4.30
3	Bank balance (sec)	14.08 ± 0.44	13.08 ± 0.42	2.08	14.31 ± 0.47	11.90 ± 0.40	4.91
4	Dynamic balance test (cm)	44.56 ± 0..90	42.47 ± 0.87	2.09	44.90 ± 0.98	39.87 ± 0.86	4.83
5	Back balance (point)	48.56 ± 0.82	49.23 ± 0.81	0.73	48.00 ± 0.80	51.61 ± 0.75	4.15
6	Sprint paced proposed (sec)	0.86 ± 0.03	0.84 ± 0.03	0.59	0.85 ± 0.03	0.76 ± 0.02	3.10
7	„In square" test (sec)	9.27 ± 0.24	8.73 ± 0.23	2.07	9.23 ± 0.27	8.07 ± 0.21	4.63
8	Assessment test distance (cm)	87.59 ± 2.60	81.36 ± 2.48	2.17	87.42 ± 2.59	74.10 ± 2.31	4.82
9	Commute (sec)	13.80 ± 0.16	13.43 ± 0.15	2.11	13.74 ± 0.16	13.00 ± 0.14	4.35
10	Hexagon (sec)	22.37 ± 0.24	21.83 ± 0.23	2.07	22.27 ± 0.21	21.23 ± 0.18	4.72
11	Matorin test (dgr)	311.25 ± 2.99	318.11 ± 2.85	2.08	312.8 ± 2.96	326.3 ± 2.63	4.28

Following an analysis of the results of our experiment, we concluded that in the initial tests there were no significant differences between the control class and the experimental class for either the girls or the boys, which

shows that they were initially homogeneous. However, the final testing shows significant differences between the performance of the experimental class and the control class.

As far as the coordination capacity is concerned, an improvement was obtained by both groups, but in the experimental group the progress achieved is higher for each of the samples.

The experimental group scored significantly higher than the control group for the coordination skills. In the final test, statistically significant initial and final test results were recorded for all the girls. In the boys' case, statistically significant results were obtained only for samples 5 and 6 where $P > 0.05$ for the control group. In this group, the rest of the results is also significant and $P < 0.01$ for samples 2, 4 and 11 and $P < 0.001$ for samples 1, 3, 7, 8 and 9. The situation is totally different for the experimental group where results from all 11 samples had a high degree of statistical significance, and $P<0,001$.

The application of the experimental programs in physical education classes has contributed substantially to developing the coordination capacity of the experimental group students. Comparing the progress achieved over a school year by the control and the experimental group, we have found that the students in experimental class that used specific means for developing their coordination capacity by means of modern, streamlined training, have achieved better results in all the competencies targeted and in meeting curriculum objectives.

Based on the statistical and mathematical data processed and compared between the two methods applied in the experimental and control groups respectively, we have found that progress has been more limited in the control group than in the experimental group for all parameters tested, such as driving skills, speed, balance, therefore we can confidently state, as a partial conclusion, that the objective of our research to improve driving skills has been reached and our working hypothesis has been confirmed.

From the observations made, we have to say that the limitations to the students' autonomy that may be manifested in class, and which may also place some limits on their capacity for self-organization, self-control and self-evaluation, can be relaxed by providing differentiated treatment during class which ensures a higher potential of subsequently transferring the assimilated skills to independent work, this being one of the goals of physical education. The fact that the experimental program included stimuli of a polyvalent nature has contributed to the simultaneous education of various driving skills. For example, the exercises used for developing coordination also provided results concerning speed, strength, muscular endurance, etc.

If we compare the elements of our modelling for physical education classes and the initial test results on the one hand with the final measurements on the other, we have the confirmation that the performance achieved both for driving skills and for coordination reaches significantly higher values in the experimental group as compared to the control group.

6. Conclusions

As far as driving skills are concerned, results confirm that over the period during which our study was conducted the subjects of both groups were in a phase of accumulation, but the experimental group recorded a higher level of significance for all indicators, especially due to the positive transfer of motor abilities, even more than in the case of coordination capacities.

In terms of coordination abilities, statistically significant results were recorded for both groups, which is explained by the fact that all subjects underwent a critical period in their development.

The modelling of physical education classes contributed substantially to developing the coordination capacity of the experimental group students, as confirmed by a higher level of significance calculated for the experimental group than for the control group.

Influencing the educational process by using appropriate methods and means for developing the coordination capacity has stimulated the students' interest and positive attitude towards physical exercise in general, and towards physical education classes in particular. The number of absences has decreased considerably, and students in the experimental group have obtained better marks.

Research has shown that the rational management of methodological procedures and means for physical education classes, based on the theoretical model proposed, yields improved performance in coordination capacity and hence driving skills, which may contribute to better achieving overall learning objectives.

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